



# EarthSense

MONITOR | ALERT | PREVENT



## EarthSense® Ground Fault Monitor

Designed to measure insulation resistance in unearthed IT systems, EarthSense monitors and detects ground faults in electrical installations where high reliability of power supply is required; such as railway, marine and other industrial applications.





### Information

The EarthSense is an insulation monitoring device designed to detect ground faults in unearthed IT systems by continuously measuring the impedance between an active phase conductor and the earth. When impedance falls below pre-set values, the unit notifies system operators via screen alerts, remote transmissions or attached devices.

This advanced fault notification system enables proactive management of maintenance resources; effectively increasing system availability by reducing the likelihood of failures and service interruption.

### Features

- Sunlight readable LCD display
- Adjustable warning and alarm trip points
- Suits AC or DC busbars up to 650V
- Modbus RTU on RS485
- Remote status polling
- Scheduled self-test function
- Remote test and reset function

### Benefits

- Continuous remote monitoring of IT systems
- Detection and removal of faults before problems occur
- Targeted maintenance and increased system availability

Supply Power (Model)	(ESM1-A)	(ESM1-B)
Voltage $U_s$	85-264 VAC	9.6-36 VDC
Frequency	50-60 Hz	na
Power Consumption	<4.5VA	<4.5VA

IT System Being Monitored	
Rated Voltage $U_n$	0-650 V
Rated frequency	DC, 20-400Hz
Maximum Insulation Voltage	750V

Insulation Coordination According to IEC 60664 Parts 1 & 4	
Rated Insulation Voltage	650V
Pollution degree	3
Protective separation to IEC61010-1	3kV, 5s

Measuring Circuit	
Operating mode	Continuous
Measuring principle	Square Wave Injection
Measuring voltage $U_m$	$\pm 24V$
Measuring current $I_m$ ( $R_f = 0\Omega$ )	$\leq 170\mu A$
Internal DC Resistance $R_i$	143k $\Omega$
Internal impedance $Z_i$	143k $\Omega$
Permissible extraneous DC voltage, $U_{fig}$	750V
System Leakage Capacitance $C_e$	$\leq 1000\mu F$

Response Values		
Response Values (Settable)	Warning $R_{an1}$	1-999k $\Omega$
	Alarm $R_{an2}$ ( $<R_{an1}$ )	1-999k $\Omega$
Recommended Settings IEC 60364-5-53 Annex H	Warning $R_{an1}$	100 $\Omega/V$ (Bus)
	Alarm $R_{an2}$	50 $\Omega/V$ (Bus)
Measurement accuracy	$<10$ k $\Omega$	$\pm 1k\Omega$
	$>10$ k $\Omega$	$\pm 5\%$
Response time $t_{an}$ at $R_f = 0.5xR_{an}$ and $C_e = 1\mu F$		$<10s$
Response delay $t_{on}$ (settable)		0-20s
Startup delay		$<30s$

### Environmental performance

Operating environment	-25°C - 70°C
Climatic categories to IEC60721	
3.1 Storage	1K4
3.2 Transport	2K3
3.3 Stationary use	3K5

### Interface

LCD 128x128 monochrome; daylight readable	
2 buttons controlling embedded software	
Authentication	Optional
Authentication method	Password
Auto-Reset after fault condition removed	Optional

### Inputs/outputs

Maximum current in control input	1mA
No-Load voltage at control input	3.3V DC
External test/reset button	Cable <10m

### MODBUS( RS485) communication

Cable length (Shielded)	1km Maximum
Identification	1-99
Parity	Odd, Even, None
Communication Speeds kb/s	2.4; 4.8; 9.6; 19.2; 38.4; 115.2

### EMC Performance

	Immunity in accordance with IEC 61000-6-1, 61000-6-2; 61326-2-4	
	Standard Test	Result
ESD	IEC 61000-4-2	L3 6kV/8kV
Radiated	IEC 61000-4-3	L3
Radio Frequency	IEC 61000-4-3	L3
Electromagnetic Field	IEC 61000-4-3	L3
Fast Transient/Burst	IEC 61000-4-4	L3
Surge	IEC 61000-4-5	L3
Conducted disturbance	IEC 61000-4-6	L3
Voltage Dips	IEC 61000-4-11	L3
Harmonics	IEC 61000-4-13	L3

### Interference emission

HF Radiation	IEC/CISPR 22	Class B
HF conducted	EN 55022	Class B

### Relays

Number, assignable	2	
Available States	N/O, N/C	
Rated Voltage	250VAC/30VDC	
Maximum Switching Voltage	277VAC/125VDC	
Rated Current	3A/5A	
Limiting Continuous Current	3A/5A	
Breaking capacity maximum	750VA (3A), 1250VA (5A)	
Contact Ratings	3A, 250VAC, $\cos\phi = 1$ , +70°C	100k cycles
(IEC61810)	3A, 30VDC, L/R=0ms, +70°C	100k cycles

### Physical properties

Dimensions (mm)	35.4 x 90.8 x 59
Weight (no packaging)	~135g
DIN Rail to IEC60715	35mm
Wall Mount	Optional
Mounting position	Vertical
MTBF	200,000 hrs
Duty time	100%
IP Rating (Internal/Terminals) IEC 60529	IP30/IP20
Flammability Rating (Enclosure)	UL94-V0
Enclosure Material	Lexan PC

### Screw Terminals

Wire size	4.0mm <sup>2</sup>
Stripping length	8mm

### Part Numbers

EarthSense Monitor (Universal AC Supply)	ESM 1-A
EarthSense Monitor (DC Supply)	ESM 1-B